

Configurable Radiation Hardened High Speed Isolated Interface ASIC, Phase I

Completed Technology Project (2006 - 2006)



Project Introduction

NVE Corporation will design and build an innovative, low cost, flexible, configurable, radiation hardened, galvanically isolated, interface ASIC chip set that will reduce power consumption, enable high efficiency power conversion management, highly integrate existing discrete solutions, enable precision isolated data conversion and communication, save weight and footprint and be more immune to radiation than the existing optocoupler technology solution. The proposed chip set configurations will interface with many communication protocols and data signaling applications. This flexible configuration enables variant uses of the silicon, increases circuit and application flexibility, allows protected, isolated interfaces between systems, and increases overall system speed and reliability while reducing complexity. A key challenge is to successfully integrate NVE's commercialized Giant Magneto-Resistive (GMR) based post processing IsoLoop

REG

technology with radiation hardened or radiation tolerant under-layer circuits. NVE has shipped millions CMOS-based commercial units using this concept. GMR material, configured into magnetically sensitive resistors, is inherently radiation hard. Customers have tested the basic sense element to a dose rate of $1.1\text{E}+12$ rads(Si)/sec. without failure. NASA Goddard (Robert Reed) tested commercial IsoLoop products to a fluence of 1×10^7 ions/cm² and observed no upsets. James Lyke of AFRL/VSEE will advise and assist NVE on the program.

Anticipated Benefits

Potential NASA Commercial Applications: There are several other applications that could be explored. The first ones are commercial applications where radiation is an issue. One potential peripheral market is the medical instrumentation area, where radiation is used for sterilization of devices. Standard devices cannot be cleaned with this technique as the electronics will shift to the point of not operating. The second one is within the containment of nuclear power plants. NVE sensors have recently been employed within containment to perform eddy current-based scans of the heads. Existing circuit isolation is opto-isolators which is slow and prone to occasional error. The last market area that will be examined is the high temperature market (200 deg C+). This market is small but required in oil exploration.



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Table of Contents

Project Introduction	1
Anticipated Benefits	1
Organizational Responsibility	1
Primary U.S. Work Locations and Key Partners	2
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

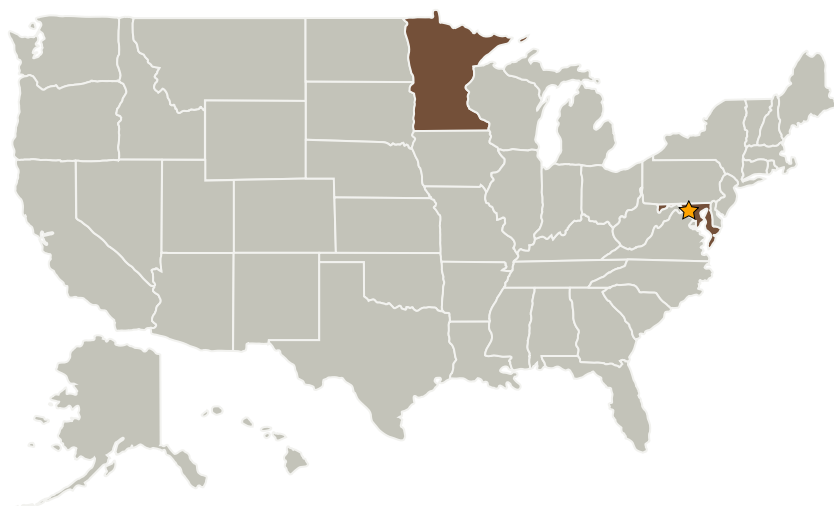
Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
NVE Corporation	Supporting Organization	Industry	Eden Prairie, Minnesota

Primary U.S. Work Locations

Maryland	Minnesota
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Myers John

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
 - └ TX02.1 Avionics Component Technologies
 - └ TX02.1.6 Radiation Hardened ASIC Technologies